

ClaimsREPLACED BY  
ART 34 AMDT

1. A medical imaging apparatus for imaging subcutaneous body temperature, the apparatus comprising a detector for sensing millimetre wave electromagnetic radiation and a collector for collecting radiation emitted from a patient's body and directing it along collection path to the detector in such a manner that the collected radiation has a defined sensitivity profile across and along substantially the entire length of that path.

2. An imager as claimed in claim 1, wherein the collector comprises a feedhorn, in particular a corrugated feedhorn.

3. An imager as claimed in claim 2, wherein the collector comprises a waveguide for supplying radiation to the detector.

4. An imager as claimed in any of the preceding claims, wherein the collector is such that the collected radiation has a Gaussian sensitivity profile.

5. An imager as claimed in claim 4 when dependent on claim 2 or claim 3, wherein the feedhorn is arranged to convert a fundamental Gaussian mode beam of radiation created by the collector into a waveguide mode in which radiation propagates through the wave guide to the detector.

6. An imager as claimed in any of claims 1 to 3 wherein the collector is such that the collected radiation has a Bessel sensitivity profile.

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7. An imager as claimed in claim 6 including an axicon.

5 8. An imager as claimed in any of the preceding claims wherein the collector includes focussing means.

10 9. An imager as claimed in any of the preceding claims, wherein the collector is operable repeatedly to sweep the collection path through 360°.

10 10. An imager as claimed in claim 9, wherein the collector comprises a deflector that is rotatable about one axis to scan the collection path in a scanning direction across a body.

15 11. An imager as claimed in claim 10 further comprising line-indexing means for moving the collection path in a direction perpendicular to the scanning direction.

20 12. An imager as claimed in claim 11, wherein the indexing means are operable to move the deflector linearly along said axis or comprise means for swinging the deflector about a second axis perpendicular to the first axis.

25 13. An imager as claimed in any of the preceding claims further comprising an isolator in the path of collected radiation for preventing signal leakage from the imager into the collection path.

30 14. An imager as claimed in claim 13, wherein the isolator is a quasi-optical isolator.

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15. An imager as claimed in any of the preceding claims that is operable to form an image from emitted radiation in the frequency range of 10-200GHz, for example 90-100GHz.

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16. An imager as claimed in any of the preceding claims including one or more calibration loads for emitting millimetre wave radiation at a pre-determined intensity, the apparatus being operable to direct said radiation to the detector to enable the apparatus to be calibrated.

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17. An imager as claimed in claim 16, wherein the or each calibration load is provided in the scanning path of the imager, so that the imager can be calibrated for each pass of the collector.

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18. An imager as claimed in claim 16 or claim 17, wherein two calibration loads are provided, together with means for maintaining them at different temperatures, the temperatures preferably straddling the range of subcutaneous body temperatures to be imaged.

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19. An imager as claimed in any of the preceding claims wherein the detector is linearly polarised.

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20. An imager as claimed in claim 19 further including polarisation means for altering the polarisation of received radiation so as to align with the polarisation of the detector.

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21. An apparatus for imaging subcutaneous body temperatures, the apparatus having a detector that is sensitive to millimetre wavelengths of electromagnetic

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radiation; a collector for collecting such radiation emitted from an area of a body and directing it towards the detector, and calibration means located in a collection path of the collector and operable to emit radiation of a known intensity.

22. A medical imaging apparatus for imaging subcutaneous body temperatures comprising a detector sensitive to millimetre wave electromagnetic radiation; a collector for collecting radiation from a target area of a body to be imaged and directing the radiation to the detector, and an isolator situated in the radiation path to the detector for preventing interfering electromagnetic radiation generated by the detector from being emitted from the device via the collector means, whilst allowing received radiation to reach the detector.

23. An imager as claimed in claim 22 wherein the isolator comprises a quasioptical isolator.

24. A medical imaging apparatus for imaging subcutaneous body temperatures, the apparatus comprising a detector sensitive to incident millimetre wave electromagnetic radiation and for generating an output representative of the image; a collector for collecting such radiation travelling from a selected area of a body to be thermally

imaged to the collector along a collection path and directing said radiation onto the detector means, and a scanner for causing said path to rotate.